UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,478	07/25/2006	Shinichi Nagata	80288 (302748)	5102

21874 7590 10/30/2008

EDWARDS ANGELL PALMER & DODGE LLP
P.O. BOX 55874
BOSTON, MA 02205

EXAMINER	
VALONE, THOMAS F	

ART UNIT	PAPER NUMBER
2831	

MAIL DATE	DELIVERY MODE
10/30/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/566,478	NAGATA ET AL.	
	Examiner	Art Unit	
	THOMAS F. VALONE	2831	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,5 and 19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5 and 19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 January 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: The term "coast" in line 20 should be changed to - - coat - -. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki (4,297,874), Shimizu (4,030,051), Osaki (4,801,862), Hoppe (IEEE 1980), Merrill (5,368,924) all of record, and Zhang.

Regarding claims 1 and 4, Sasaki teaches a microwave cavity resonator device or method for measuring moisture content, with a slit in which a specimen is disposed being placed in a manner so as to cross the resonator portion (Fig. 2), with a measuring frequency, used to determine moisture content based on a difference in resonance peak level between the cases when the specimen is not present in the slit and when it is present in the slit (col. 3, 30-39). Sasaki further teaches a resonator portion (cavity resonator 11, Fig. 2) since both ends are closed and traveling wave portions (16, 19, Fig. 2).

Sasaki does not teach two iris plates which are arranged perpendicular to and spaced along the tube axis having a hole at mid-point of a wave guide, a portion between the iris plates forming a resonator portion and the outside of each of the iris plates forming traveling wave portions as in claims 1 and 4, or the division of peak values by frequency values and does not include a sheet-shaped material specimen bearing a plurality of coat layers and making the measurement with and without the outermost coat layer and does not include the resonant peak occurs when the specimen is present in the slit has a lower Q value than the resonance peak when the specimen is not present in the slit.

Shimizu from the same field of endeavor, teaches two single-holed iris plates which are arranged perpendicular to and spaced along a tube axis at mid-points of a wave guide, a portion between the iris plates forming a resonator portion and the outside of each of the iris plates forming traveling wave portions (Fig. 1). As to the predetermined range between 1 to 25 GHz, it is inherent to microwaves to operate in this range, because the resonant cavity size is half a wavelength, as suggested by Shimizu (col. 1, line 40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included Shimizu's iris plate design, which maximizes coupling to the specimen in the center, with a coaxial resonator portion separate from the traveling wave portion, setting a measuring frequency in a range between 1 and 25 GHz, as in claims 1 and 4, because they are already at each end of Sasaki's resonant

portion, which already includes a traveling wave portion separate from the resonator portion, and in order to maximize coupling to the specimen being tested.

Sasaki and Shimizu (S-S) does not teach two iris plates which are arranged perpendicular to and spaced along the tube axis at mid-points of a wave guide or the division of peak values by frequency values for the specimen and does not include a sheet-shaped material specimen bearing a plurality of coat layers and making the measurement with and without the outermost coat layer and does not include the resonant peak occurs when the specimen is present in the slit has a lower Q value than the resonance peak when the specimen is not present in the slit.

Osaki, from the same field of endeavor, teaches two circular-holed iris plates which are arranged perpendicular to and spaced along the tube axis at mid-points of a wave guide (Fig. 2 and Fig. 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included Osaki's iris plate design in the moisture detector of S-S, for the benefit of rotatably accommodating the iris holder about the axis, making it independent of rotation, as suggested by Osaki (col. 2, line 65-68).

Sasaki, Shimizu and Osaki (S-S-O) does not teach a sheet-shaped material specimen bearing a plurality of coat layers and making the measurement with and without the outermost coat layer and does not include the division of peak values by frequency values for the specimen during its presence and absence and does not

include the resonant peak occurs when the specimen is present in the slit has a lower Q value than the resonance peak when the specimen is not present in the slit.

Hoppe (IEEE Transactions, 1980), from the same field of endeavor, teaches the water content of a specimen can be "simply" found by taking the ratio of the differentials $\Delta f/\Delta P$ (p. 1451, col. 1). Hoppe further identifies the Δf and ΔP subtractions as the difference between the empty cavity and the insertion of the specimen (p. 1451, col. 1). A standard inversion of $\Delta f/\Delta P$ creates the claimed ratio $\Delta P/\Delta f$ which has the same or equivalent import, to one of ordinary skill. It is also noted, that the claimed "difference in resonance peak levels" is interpreted as the "ΔP" value, in light of the instant specification (instant disclosure, p. 22, line 25-30 and Fig. 15). Therefore, the claimed "difference in resonance peak levels" which is identified as differential "ΔP" values, is broadly interpreted to be either voltage or power levels.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included a division ratio of resonance peak values and resonant frequency values between the presence and absence of a specimen as taught by Hoppe in the S-S-O method of measuring moisture content, so as to provide an "unambiguous function" of water or moisture content as suggested by Hoppe (p. 1451, col. 1).

The teachings of S-S-O as modified by Hoppe (S-S-O-H) are reviewed above.

S-S-O-H does not include a sheet-shaped material specimen bearing a plurality of coat layers and making the measurement with and without the outermost coat layer

and does not include the resonant peak occurs when the specimen is present in the slit has a lower Q value than the resonance peak when the specimen is not present in the slit.

Merrill teaches a coated glass fabric that is moisture resistant (col. 1, line 35-55) which is composed of a plurality of coated layers (col. 3, line 1-10 and first to fifth coatings, col. 3, line 50-68 to col. 4, line 1-20). Merrill further indicates the sheet-shaped fabric is used in a microwave environment because of its non-interference capability (col. 1, line 35-40).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included Merrill's sheet-shaped material bearing a plurality of coat layers laminated on the surface just before and just after application of the subsequent outermost layer in a S-S-O-H microwave cavity resonator to measure its moisture content and confirm that any moisture has been evaporated (Merrill, col. 3, line 9).

The teachings of S-S-O-H as modified by Merrill (S-S-O-H-M) are reviewed above.

S-S-O-H-M does not include a teaching that the resonant peak occurs when the specimen is present in the slit has a lower Q value than the resonance peak when the specimen is not present in the slit.

Zhang from an analogous field of endeavor teaches that a resonant peak occurs when the specimen is present in a resonant cavity has a lower Q value than the

resonance peak when the specimen is not present in the cavity because of the additional power dissipation loss of the load (p. 223). Zhang explicitly defines the unloaded cavity $Q = \omega W/P_o$ (inverse of eq. 4.26) and the loaded cavity $Q_L = \omega W/(P_o + P_L)$ by the inverse of eq. 4.28, which means that the loaded cavity with a specimen present has a lower Q value because of the additional term in the denominator.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have noted the relationship of a resonant peak of the S-S-O-H-M method of measuring moisture content when the specimen is present in a resonant cavity has a lower Q value than the resonance peak when the specimen is not present in the cavity as taught by Zhang, for the benefit of distinguishing between a loaded and unloaded cavity, as suggested by Zhang (p. 223).

4. Claims 5 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki, Shimizu, Osaki, Hoppe, Merrill and Zhang (S-S-O-H-M-Z), as applied to claims 1 and 4 above, and further in view of Dammig (6,983,516).

The teachings of S-S-O-H-M-Z are reviewed above.

S-S-O-H-M-Z does not include a consideration for temperature such as a temperature dependency value storage unit for resonant peak level storage, a temperature sensor, or a correction means that corrects the resonance peak value based on the detected temperature from the sensor.

Dammig teaches that the effect of temperature on microwave measurements can falsify the results (col. 4, line 64-67). Dammig further teaches using a temperature

sensor (col. 5, line 5) and using stored temperature dependency curves to compensate for the calculated moisture content to calibrate the frequency shift of the resonant peak (col. 5, line 45-55 and col. 6, line 20-40). Dammig also includes a correction means (microprocessor, col. 6, line 52) that corrects the resonant peak measurement (col. 5, line 15-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included in the S-S-O-H-M-Z resonant cavity moisture measurement, a temperature dependency value storage unit for resonant peak level storage, a temperature sensor, or a correction means that corrects the resonance peak value based on the detected temperature from the sensor, as taught by Dammig for the benefit of compensating for the effect of temperature, as suggested by Dammig (col. 8, line 57-65).

Response to Arguments

5. Applicant's arguments (Remarks) do not contain any new arguments that have not been addressed previously which specifically point out how the language of the claims patentably distinguishes them from the references.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Assenheim, Troxler, Minami teach microwave moisture determination with measurement of changes in Q factor.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THOMAS F. VALONE whose telephone number is (571)272-8896. The examiner can normally be reached on Tu-W-Th, 10:30-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thomas F Valone/
Patent Examiner, Art Unit 2831

Thomas Valone, PhD, PE
Patent Examiner
Art Unit 2831
571-272-8896